#### **OUTLINE**

## Onsite Wastewater Treatment Systems Soil and Site Evaluation, Design, Construction and Maintenance DAY 1 -- Monday, January 26, 2009

8:00	A.	OPENING REMARKS—Dan Heintzman,	P.E.
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- 1. Welcome
- 2. Statement of purpose

## 8:15 B. INTRODUCTION—Jerry Tyler

- 1. Options for on-site disposal of wastewater
- 2. Strategy for site evaluation design selection, construction, use, and management of on-site systems
- 3. The operating subsurface soil absorption system
- 4. When you have completed this class you should be able to

## 9:00 C. SOIL AND SITE CHARACTERISTICS—Jerry Tyler

- 1. Soil and Site Evaluation overview
- 2. Soil—a definition
- 2. Soil as a three phase system
  - a. gas
  - b. solid
  - c. liquid
- 3. Soil pores
- 4. Defining the solid phase of soil in the field
  - a. separates
  - b. clay mineralogy
  - c. texture

## 9:30 D. WASTEWATER VOLUME AND CHARACTERISTICS—Jim Converse

- 1. Wastewater volume
  - a. For single family homes
  - b. Other
- 2. Wastewater constituents
  - a. BOD and COD
  - b. Suspended solids
- 3. Biological constituents
  - a. Bacteria
  - b. Viruses

- c. Other
- 4. Chemical
  - a. Nitrogen compounds
  - b. Phosphorous compounds
  - c. Volatile organic compounds

#### 10:00 BREAK

10:15 LABORATORY AND PROBLEM SESSION I Groups change at 10:45

SESSION IA:

Field evaluation of soil characteristics (Jerry Tyler)

(Corresponds to Lecture, Section C)

SESSION IB:

Estimating wastewater load and quality (Jim Converse)

(Corresponds to Lecture, Section D)

#### 11:45 QUIZ 1

#### 12:00 LUNCH

1:00 E. SOIL AND SITE CHARACTERISTICS (Continued.)—Jerry Tyler

- 4. Defining the solid phase of soil in the field
  - d. Structure
  - e. Consistence
  - f. Soil color
- 2:00 F. PRETREATMENT AND NON-SOIL TREATMENT—Jim Converse
  - 1. Septic tanks
  - 2. Sand filters
  - 3. Aerobic units
  - 4. Other systems
  - 5. Disinfection

#### 3:15 BREAK

3:30 LABORATORY AND PROBLEM SESSION II Groups change on Day 2

SESSION IIA:

Field evaluation of soil characteristics (Corresponds to

Lecture, Section E)

SESSION IIB:

Selection and design of pretreatment units (Corresponds to

Lecture, Section F)

## DAY 2 Tuesday, January 27, 2009

8:00 LABORATORY AND PROBLEM SESSION II (Continued.) Groups change from Day 1

SESSION IIA: Field evaluation of soil characteristics (Corresponds to Lecture,

Section E)

SESSION IIB: Selection and design of pretreatment units (Corresponds to

Lecture, Section F)

- 9:00 QUIZ 2
- 9:15 G. SOIL AND SITE CHARACTERISTICS—Jerry Tyler
  - 5. Soil horizons
    - a. nomenclature
  - 6. Soilscapes
- 9:45 BREAK
- 10:00 H. SOIL ABSORPTION SYSTEMS INGROUND—Jim Converse
  - 1. The options
    - a. Beds
    - b. Trenches
    - c. Drop boxes
    - d. Other
- 10:30 LABORATORY AND PROBLEM SESSION III Groups change at 11:15 SESSION IIIA: Field evaluation of soil characteristics (Corresponds to Lecture, Section G)

SESSION IIIB: Design of inground systems (Corresponds to Lecture, Section H)

- 12:00 QUIZ 3
- 12:15 LUNCH
- 1:00 I. SOIL AND OTHER RESOURCE INFORMATION—Jerry Tyler
  - 1. Soil maps
  - 2. Soil taxonomy—an introduction
  - 3. Topographic maps
  - 4. Airphoto analysis

- 5. Other resource information
- 1:30 J. DISTRIBUTION SYSTEMS—Jim Converse
  - 1. Distribution of wastewaters
    - a. Gravity
      - 1) Distribution boxes
      - 2) Drop boxes
      - 3) With pipe
      - 4) Without pipe
    - b. Pressure distribution
      - 1) Pressure manifolds
      - 2) Pressure distribution networks
      - 3) Siphons and pumps
      - 4) Drip distribution
- 2:30 LABORATORY AND PROBLEM SESSION IV Groups change after break SESSION IVA: Soil and other resource information (Corresponds to Lecture, Section I)
- 3:15 BREAK

SESSION IVB: Design of gravity distribution (Corresponds to Lecture, Section J)

4:15 QUIZ 4

#### DAY 3 -- Wednesday, January 28, 2009

# 8:00 K. SOIL WATER MOVEMENT—Jerry Tyler 1. Soil water in soil pores 2. Soil water potential

- 3. Saturated flow
- 4. Unsaturated flow
- 5. Estimating water movement in soil
- 6. Water movement through layered soils
- 7. Relationship of estimated flows and design of disposal systems

#### 9:15 L. SOIL TREATMENT OF WASTEWATERS—Jerry Tyler

- 1. Organisms
- 2. Nutrients
- 9:45 BREAK
- 10:00 M. DESIGNING OF AT-GRADE SYSTEMS—Jim Converse
  - 1. Soil and site characteristics
  - 2. The soil absorption area
- 10:45 LABORATORY AND PROBLEM SESSION V Groups change after lunch SESSION VA: Water movement in soil (Corresponds to Lecture, Sections K & L) SESSION VB: Design of At-grade Systems (Corresponds to Lecture, Section M) and Drip distribution
- 12:15 LUNCH
- 1:15 LABORATORY AND PROBLEM SESSION V (Continued)
- 2:45 QUIZ 5
- 3:00 BREAK
- 3:15 N. SOIL AND SITE EVALUATION—Jerry Tyler
  - 1. Observing the landscape and recording data
  - 2. Selecting soil areas for further observations
  - 3. Observing soil profiles and recording data
- 3:45 O. INTERPRETING SOIL AND SITE INFORMATION—Jerry Tyler
  - 1. Landscapes and water movement
  - 2. Soil profile interpretations
  - 3. Estimating water movement and design loading rates

#### DAY 4 -- Thursday, January 29, 2009

- 8:00 P. DESIGN OF MOUND SYSTEMS—Jim Converse
  - 1. Soil and site criteria
  - 2. System sizing and configuration
- 8:30 Q. SYSTEM CONSTRUCTION—Jim Converse
  - 1. Designing so construction is possible
  - 2. Preparing a construction plan
  - 3. Implementation of construction plans
  - 4. Construction inspection
- 9:00 R. WASTEWATER COLLECTION SYSTEMS—Jim Converse
- 9:15 LABORATORY AND PROBLEM SESSION VI Groups change after break SESSION VIA: Soil and site evaluation and interpretation (Corresponds to Lecture, Sections N & O)
  SESSION VIB: Designing Mound Systems (Corresponds to Lecture, Section P)
- 10:15 BREAK
- 10:30 LABORATORY AND PROBLEM SESSION VI (Continued)
- 11:30 QUIZ 6
- 12:00 LUNCH
- 1:00 S. OPERATION AND MAINTENANCE AND SYSTEM RENOVATION Jim Converse
  - 1. Septic tank maintenance
  - 2. Observing the soil absorption area
  - 3. Renovating the failed system
- 1:45 T. MONITORING AND INSPECTING—Jim Converse Jerry Tyler
- 2:00 LABORATORY AND PROBLEM SESSION VII—Jerry Tyler Jim Converse SESSION VII: Matching the soil and site with a design (As one group) (Corresponds to Lecture, Sections P, Q, R, and S)
- 3:30 U. DISCUSSION, SUMMARY AND REVIEW
- 4:00 V. USING THE INFORMATION PROVIDED—Dan Heintzman, P.E.